

DRAFT ADVISORY RULING

**MASSACHUSETTS DIVISION OF ENERGY RESOURCES
Renewable Energy Portfolio Standard**

**In Regard to the Biomass Conversion of the
Schiller Station Unit 4 - Portsmouth, NH
Public Service of New Hampshire (PSNH)**

July 17, 2003

1. Advisory Ruling – Request of Public Service of New Hampshire

Public Service of New Hampshire (PSNH) has requested that the Massachusetts Division of Energy Resources (DOER or the “Division”) provide an Advisory Ruling with regard to the qualification as an approved generator for the Massachusetts Renewable Energy Portfolio Standard (RPS) of a planned biomass energy generation unit. The RPS regulations, at 225 CMR 14.06 (5)¹ provides an opportunity for a generation unit owner or developer “to request an advisory ruling from the Division to determine whether a Generation Unit would qualify as a New Renewable Generation Unit.” The primary purpose of an Advisory Ruling is to provide existing or new generation developers the opportunity to better understand the likelihood that a generation unit will qualify as a New Renewable Generation Unit under the RPS regulations prior to committing significant investment in time or money to project development.

DOER received a letter from PSNH dated April 4, 2003, formally requesting the Advisory Ruling and providing sufficient description and information about the biomass generation unit being considered. PSNH has requested that this Advisory Ruling be shared with the public to solicit comments. Consequently, DOER is distributing this Draft Advisory Ruling to RPS and biomass stakeholders, and offers interested persons with this opportunity to comment on the Draft Advisory Ruling before DOER issues a final Advisory Ruling.

Written comments from the public are due to DOER by **August 15, 2003**, and should be sent by mail, fax, or email to the address below. At the end of the public comment period, DOER will issue a final advisory ruling.

RPS Mailbox
Division of Energy Resources
70 Franklin St., 7th Floor
Boston, MA 02110-1313
Fax: (617) 727-0030 Email: doer.rps@state.ma.us

¹ Hereafter, all references to the RPS regulations will be to sections of 225 CMR 14.00.

2. Description of Biomass Project

PSNH owns and operates the 150 MW coal and oil fired Schiller Station in Portsmouth, NH. The facility consists of three stand-alone 50 MW boilers, each with its own associated generation equipment. PSNH is considering replacing one of these boilers with a fluidized bed (FB) boiler with the capability and intent to burn 100% wood chips as its fuel source. The FB boiler would make use of the existing associated equipment to generate electricity with the new boiler, although the unit would remain independent of the other two 50 MW coal and oil units. The FB boiler, with the associated generation equipment, would also be rated at a capacity of 50 MW.

The FB boiler will have the capacity and be permitted to burn 100% coal (or any combination of wood and coal), in addition to all wood. PSNH has indicated this is critical for project financing and operational risk in the event that the wood fuel supply becomes unavailable.

PSNH has received emission specifications and guarantees from an unspecified FB vendor that have been shared with DOER and the Massachusetts Department of Environmental Protection (DEP). PSNH states that these guaranteed emissions would be equal to or below recent Best Available Control Technology (BACT) requirements for both wood and coal. As per DEP, BACT requirements for a particular project must be determined on a case-by-case basis, and will be determined for this project by the New Hampshire Department of Environmental Services (NH DES).

3. Discussion of Vintage Generation Unit

As per the definitions in the RPS regulations (Section 14.02), a Vintage Generation Unit is a unit that meets RPS qualification standards, and was in operation on or before December 31, 1997. Although the Schiller Station unit was in operation before this date, it never operated with an eligible renewable resource or fuel and never met RPS technical standards. Hence, it is DOER's conclusion that this unit would not be a Vintage Generation Unit under the RPS regulations.

This conclusion is consistent with the objectives of the RPS program to bring new renewable energy generation into operation in New England and displace conventional generation resources.

4. Discussion of Eligible Biomass Fuels and Co-firing

PSNH intends to reduce the coal use of the Schiller Station by one-third of its current levels by utilizing biomass (wood chips) in the new FB boiler, which would burn up to 450,000 tons of wood per year. PSNH states that the wood supply for the Schiller Station would come substantially from New Hampshire and Massachusetts as whole tree chips, clean urban wastes,

pallets, and, possibly, clean construction and demolition (C&D) wastes. This list of sources is consistent with the definition of Eligible Biomass Fuel in Section 14.02 of the RPS regulations.²

As stated above, PSNH claims that the Schiller Station FB generation unit will primarily burn clean wood chips and other RPS-eligible biomass fuels. However, for reasons of fuel supply risk and financing, PSNH seeks to obtain a permit to use coal in periods of time when wood is unavailable. At such times, Schiller might operate in a co-firing mode with wood and coal simultaneously fed into the boiler, or in non-concurrent mode with 100% coal.

RPS regulations at 14.05(3) provide for the co-firing of biomass with an ineligible fuel. In the case of the Schiller Station FB unit, this may take the form of coal or some other ineligible fuel listed in its state permit. To qualify under RPS, the unit's actual emissions under any co-firing scenario must remain within the "low emission" criteria for biomass conversion set forth by DOER in consultation with the Massachusetts DEP (see further discussion in Section 6 of this Advisory Ruling).

As per the RPS regulations at Section 14.05(3)(a), under co-firing, the electrical energy generation that qualifies for RPS certificates over a given period of time is equal to the ratio of the net heat content of the Eligible Biomass Fuel consumed to the net heat content of all fuel consumed in that time period.

DOER will require PSNH to report periodically on the different types of fuel input to the generation unit and the BTU content of the different fuels.

5. Discussion of Advanced Biomass Technology

The RPS statute and regulations provide (at Section 14.05(1)(a)6) that the qualification of biomass generation units is limited to "low emission, advanced biomass power conversion technologies using an Eligible Biomass Fuel." DOER believes the legislative intent of these criteria is to insure that the RPS cause older, dirtier technologies to be replaced by cleaner and more efficient technologies. DOER also believes that biomass technologies should improve over time, both pursuant to the incentives created by the RPS and, more broadly, continued technological progress in the electricity sector.

Fluidized bed (FB) technology for steam generators was developed during the 1950's and 1960's and introduced during the 1970's. Its earliest perceived benefit was to reduce air emissions from the combustion of coal, followed by its flexibility and its ability to burn a wide range of solid fuels. In addition to coal, FB can be used with a wide range of fuels with lower energy value and higher moisture content – industrial and municipal wastes, as well as forestry and agriculture-

² PSNH is advised, however, that any organic refuse derived fuel used in the generation unit must be collected and managed separately from the municipal solid waste stream and be substantially devoid of contaminating elements such as paints, stains, and construction debris to be eligible. DOER may request that records of fuel supplies be maintained and reported to DOER, and DOER retains the right to inspect fuel supplies upon request.

derived biomass. The earliest fluidized bed boilers were bubbling fluidized bed (BFB), but circulating fluidized bed (CFB) boilers soon developed as a second-generation adaptation. These two variants were first demonstrated in pilot projects, followed by scaling-up, commercialization, and application to various fuels. BFB units tend to be smaller and are the more likely choice for waste streams and biomass, while larger CFB units have been developed and are the more likely choice for utility boilers burning coal.

During the past two decades, further improvements have been made in materials and configuration. Among CFB boilers, for example, a major distinction developed between those that separated the solids from the gases using a large cyclone separator versus those that used impact separators. CFBs from Babcock and Wilcox use the latter type, including two of its earliest units, installed in 1986 at two wood burning power plants in Maine. Babcock and Wilcox subsequently modified its company's separator design and later introducing internal recirculation of the solids. Other recent innovations include a combination or hybrid of CFB and BFB, available from several companies, as well as a pressurized fluidized bed.

Most fluidized bed boilers are produced by the following companies (in an industry characterized by much consolidation): Foster Wheeler (including the Finnish Ahlstrom Pyropower), Babcock and Wilcox, Energy Products of Idaho, LLB (including Lurgi/Lentjes and Deutsche Babcock), KvaernerGroup (including Tampella Power), and GEC Alsthom. The technology has been much less widely adopted in the U.S. than in Europe, with the number of fluidized bed boilers in the U.S. numbering in the scores compared to the hundreds in Europe.

Although already commercialized, fluidized bed technology is relatively young and still undergoing significant innovation and improvement, with regard to technical efficiency, cost, and emissions. DOER has determined that the proposed Shiller project will utilize a more advanced fluidized bed technology than do the two 1986 Indeck boilers in Maine, already qualified for RPS under the Vintage waiver at 14.05(2). Therefore, DOER's conclusion is that the proposed fluidized bed technology meets the "advanced technology" criterion of the regulations and statute.

6. Issues regarding Low Emissions

Biomass energy must meet the criterion of "low emissions" to be an eligible renewable generation source for the RPS. This criterion does not set specific emission targets. Therefore, DOER believes the legislative intent is for the threshold for eligibility to become more stringent as biomass conversion and emission control technologies improve. Under RPS regulations, a generator must receive a valid air permit from its appropriate state air quality regulator to qualify as an eligible biomass generator and, if outside Massachusetts, its emission rates must be consistent with comparable biomass units prescribed by the DEP.

This Advisory Ruling does not constitute a decision on the specific emission levels the facility must meet to be RPS eligible. Nor does this Advisory Ruling suggest that sufficient data has been presented to DOER and the DEP to form a basis for RPS approval at the projected emission levels. The Advisory Ruling serves as guidance to the project developers regarding the

assessment of DEP and DOER of proposed emission levels, and the generation unit's consistency with the RPS "low emission" requirement. DOER expects that the emission levels of the generation unit design will be included in PSNH's eventual RPS application and that these levels will not vary substantially from what is currently proposed (other than being more stringent).

PSNH has submitted to DOER air emissions levels that have been specified and guaranteed by an unnamed vendor, and PSNH predicts the unit's emissions will be equal to or below BACT requirements for woody biomass and coal boilers of this size and general type. As stated above, however, NH DES ultimately must determine BACT requirements for this project, not the applicant. The emission levels for the generation unit, specified by the vendor, are presented in the table below. PSNH has stated that all emission limits presented in the table can be met under all permitted fuel inputs and combinations (e.g. 100% biomass, co-firing biomass with coal, or 100% coal), with the exception of the higher SO_x emissions (as noted in table) under 100% coal firing.

AIR EMISSION LIMITS FOR PROPOSED AND EXISTING GENERATION UNITS

Proposed Generation Unit				Existing Generation Units					
PSNH Schiller Station Portsmouth, NH				Indeck / Ridgewood Power ¹ West Enfield, ME			Pine Tree / Tractabel ² Westminster, MA		
Generation Unit Data									
Type of Unit	Fluidized Bed			Circ. Fluidized Bed			Riley Stoker Boiler		
Date of Operation	n/a			Oct-87			May-92		
Emission Control Technology	BACT - design to be determined			multicyclone, ESP			multicyclone, fabric filter, SNCR		
Plant Net Capacity, MW	45			27			16		
Boiler Heat Rate, MMBtu/hr	608			362			260		
Biomass Input, tons/yr	500,000			170,968			180,000		
Emission Limits	lbs/MMBtu	lbs/hr	tons/year	lbs/MMBtu	lbs/hr	tons/year	lbs/MMBtu	lbs/hr	tons/year
SO ₂	0.02	12.16	52.9	0.03	11	44.4	0.03	7.8	33.9
(under 100% coal)	0.12								
NO _x	0.08	48.64	211.6	0.3	108.45	249.9	0.175	45.5	197.9
PM	0.011	6.7	29.1	0.03	10.8	45.1	0.02	5.2	22.6
PM ₁₀	0.011	6.7	29.1	0.03	10.8	45.1			
CO	0.1	60.8	264.5	0.17	62.2	249.9	0.22	57.2	248.8
VOC	0.008	4.9	21.2	0.10	36.2	145.8			
Lead							0.0007	0.18	0.79
Ammonia	10 ppm						10 ppm	2.04	8.9

Bold/Italics = calculated value as lbs/hr / Boiler Heat Rate

1. Data from Maine DEP Air Emission License A-91-70-A-I
2. Data from Massachusetts DEP Permit (Application No. C-B-89-031)

The table also includes air emissions permit data for two existing biomass generation units. The Indeck generating unit employs a circulating fluidized bed technology and has previously been qualified as a generator for the Massachusetts RPS program. The Pine Tree generation unit is the most recent biomass generation unit constructed in Massachusetts (1992) and therefore meets more recent emission levels; however, due to its stoker combustion technology and its vintage, it is not eligible under the RPS regulations.

The emissions data that PSNH has submitted for the Schiller biomass generation unit show emission reductions as compared to the existing Indeck and Pine Tree generation units. DOER and DEP are encouraged by these emission values, most notably the reductions in NO_x and PM/PM₁₀. DOER and DEP consider these proposed emission limits to be consistent with the “low emissions” criterion for RPS biomass generation units. The determination in this matter in no way constitutes a judgement of whether those limits in fact represent BACT.

Under a co-firing situation, the RPS regulations at 14.05(3) state that the overall generation unit emissions must still meet the low emissions criteria. DOER also recognizes the reasons that cause the company to want the Schiller generation unit to be permitted for coal use. DOER and DEP recognize that the proposed increase in SO₂ emissions inherent under coal firing could place the unit in certain circumstances outside the biomass “low emission” criterion. However, given that coal would be used only as a “contingency” fuel, DOER believes it would be unreasonable to disqualify the generation unit for RPS eligibility based solely on such a contingency.

Therefore, DOER expects to establish the following guidance for the generation unit, with details and firm emission targets and monitoring rules to be provided as part of the RPS application and qualification process.

- Subject to an acceptable final application, the generation unit would be approved contingent on meeting prescribed low emission targets (consistent with the values proposed in the above table, including the lower SO₂ limit).
- The generation unit would continue to receive RPS Certificates for all generation attributed to eligible biomass fuel, as long as the generation unit stays within the low emission criterion (including the lower SO₂ limit) prescribed. Even under a co-firing mode, the generation unit must stay within these limits to receive the pro rata amount of RPS Certificates as provided in Section 14.05(3)(a). No RPS Certificates will be received for generation while the low emission criterion is exceeded.
- Upon any exceedence of the RPS low emission criterion, PSNH will be required to promptly inform DOER and the GIS Administrator. PSNH will again promptly inform DOER and the GIS Administrator when the generation unit returns to the low emissions limits.
- If the generation unit exceeds the prescribed low emission limits for an extended period of time (90 days) using any fuel, PSNH must promptly inform DOER and the GIS Administrator, and the generation unit’s receipt of RPS Certificates will be suspended. The suspended status will remain in effect until the unit returns to the low emission standard. The unit owner must inform the GIS Administrator and DOER of the unit’s return to compliance with such standards and provide satisfactory emissions monitoring data and reports on measures taken to return the unit to the low emission limits.
- DOER will require PSNH to periodically report the fuel use and emissions from the generation unit, and to inform DOER promptly of any exceedence of the RPS low emission limits established for the generation unit.

7. Summary of Ruling and Rationale

DOER has found the proposed conversion of the Schiller generation unit 4 to a fluidized bed biomass generation unit to fall within the eligibility criteria for new renewable generation biomass units as described in Section 14.05(1). The following guidance summarizes the key issues for PSNH to consider in their project planning, and by which DOER will be guided in reviewing the generation unit's application to qualify as a new renewable energy generation unit for the Massachusetts RPS.

1. PSNH is reminded of the definition of Eligible Biomass Fuel and that RPS Certificates will be allocated only for generation that is derived from such eligible fuels. In the case of co-firing with an ineligible fuel, the quantity of RPS Certificates generated will be based on the relative BTU value of the eligible biomass fuel (provided the low emission limits are not exceeded as prescribed earlier and summarized below).
2. DOER recognizes the proposed Schiller fluidized bed biomass generation unit as advanced technology in light of the continued improvements in the technology since its development in the 1970s. The Schiller plant as proposed demonstrates substantial technical advances compared to the Indeck plants, particularly in emissions reductions.
3. DOER considers the emission specifications PSNH has proposed for the generation unit to be within the range of low emissions as required in the RPS regulations. PSNH has stated the intent to use biomass at all times except when the biomass supply becomes unavailable and coal must be used as a contingency fuel. PSNH recognizes that with the use of coal, the SO₂ emissions may rise above the RPS prescribed low emissions level for biomass.
4. PSNH is reminded that the RPS regulations state that for a co-firing generation unit to be qualified for the RPS, the low emissions biomass standard must apply to the entire generating unit. DOER will not allow any RPS Certificates to be created while the generating unit exceeds an established low emissions criterion even if some eligible biomass fuel is used.
5. DOER will establish a periodic reporting procedure for PSNH to inform DOER and the GIS Administrator of fuels input to the generation unit and emissions. Upon any exceedence of the RPS low emission criterion, PSNH will be required to promptly inform DOER and the GIS Administrator. PSNH will again promptly inform DOER and the GIS Administrator when the generation unit returns to the low emissions limits.
6. If the generation unit exceeds the prescribed low emission limits for an extended period of time (90 days) using any fuel, PSNH must promptly inform DOER and the GIS Administrator, and the generation unit's receipt of RPS Certificates will be suspended. The suspended status will remain in effect until the unit returns to the low emission standards. The unit owner must inform the GIS Administrator and DOER when the unit returns to compliance, and must provide satisfactory emissions monitoring data and a report on measures taken to return the unit to the low emissions compliance.